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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/714,966	11/18/2003	Cyril Cabral JR.	YOR920030287US1 (20140-00)	4605
30678	7590	11/04/2004	EXAMINER	
CONNOLLY BOVE LODGE & HUTZ LLP SUITE 800 1990 M STREET NW WASHINGTON, DC 20036-3425			VU, HUNG K	
			ART UNIT	PAPER NUMBER
			2811	

DATE MAILED: 11/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/714,966	<b>Applicant(s)</b> CABRAL ET AL.	
	<b>Examiner</b> Hung Vu	<b>Art Unit</b> 2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 16 August 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-39 is/are pending in the application.
- 4a) Of the above claim(s) 11-21 and 29-31 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6, 8-10, 22-25, 28, 32-35 and 37-39 is/are rejected.
- 7) ☒ Claim(s) 7, 26, 27, 36 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>11/18/03</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election without traverse of Invention of Group I, Claim 1-10, 22-28 and 32-29 in the reply filed on 08/16/04 is acknowledged.

Claims 11-21 and 29-31 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 08/16/04.

### *Double Patenting*

2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-4, 8-10, 22-25, 28, 32-35 and 38-39 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 and 2 of U.S. Patent No. 6,573,606. Although the conflicting claims are not identical, they are not patentably distinct from each other because claims 1, 22 and 32 are generic to claims 1 and 2 of U.S. Patent No. 6,573,606. The claimed invention (claims 1, 22 and 32) of the present application is a mere broader version of the claimed invention (claims 1 and 2) of the above identified U.S. Patent

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with similar intended scope, thus allowing unjustified or improper timewise extension of the “right to exclude” granted by a U.S. Patent No. 6,573,606.

***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1-3, 8-10, 22-24, 28, 32-34 and 38-39 are rejected under 35 U.S.C. 102(a) as being anticipated by Lopatin et al. (PN 6,528,409, of record).

Lopatin et al. discloses, as shown in Figures 13-19, 24 and 35, a composite material comprising:

a layer containing copper (230,308);

a CoWP film (234,318) on the copper layer, wherein the CoWP film contains from 11 atom percent to 25 atom percent phosphorus and has a thickness from 5 nm to 200 nm [Col. 10, lines 45-59].

The term “electrodeposited” is method recitation in a device claimed. Note that only the final product is relevant, not the method of making. A product by process claim is directed to the product per se, no matter how actually made. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claimed in “product by process” claims or not.

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With regard to claims 2, 23 and 33, Lopatin et al. discloses the CoWP film contains from 3 atom percent to 10 atom percent tungsten.

With regard to claims 3, 24 and 34, Lopatin et al. discloses the CoWP film consists essentially of  $\text{Co}_x\text{W}_y\text{P}_z$ , wherein  $0.68 < x < 0.88$ ;  $0.01 < y < 0.10$ ; and  $z = (1 - (x + y))$ .

With regard to claim 5, Lopatin et al. discloses the copper layer is disposed between the CoWP film and a metal layer (240).

With regard to claim 6, Lopatin et al. discloses the copper layer and the metal layer is disposed within a trench or via of a dielectric material.

With regard to claims 8, 9 and 38, Lopatin et al. discloses the CoWP film has a thickness from 10 nm to 50 nm (with the range of 5 nm to 50 nm or 10 nm to 30 nm).

With regard to claim 22, Lopatin et al. discloses, as shown in Figures 13-19, 24 and 35, an interconnect structure comprising:

- a dielectric layer (310) in contact with a metal layer;

- a CoWP film (318) on the metal layer layer, wherein the CoWP film contains from 11 atom percent to 25 atom percent phosphorus and has a thickness from 5 nm to 200 nm

- a conducting layer (322) containing copper on the CoWP film [Col. 10, lines 45-59].

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The term “electrodeposited” is method recitation in a device claimed. Note that only the final product is relevant, not the method of making. A product by process claim is directed to the product per se, no matter how actually made. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claimed in “product by process” claims or not.

With regard to claim 28, Lopatin et al. discloses the copper conducting layer is recessed within the dielectric layer.

With regard to claim 32, Lopatin et al. discloses, as shown in Figures 13-19, 24 and 35, an interconnect structure comprising:

- a trench or a via disposed within a dielectric material (222,246,252,310), wherein the trench or via is filled with a metal layer (230,308) disposed along the sidewalls of the trench or the via, and a conducting layer containing copper;

- a CoWP film (234,318) on the copper layer, wherein the CoWP film contains from 11 atom percent to 25 atom percent phosphorus and has a thickness from 5 nm to 200 nm [Col. 10, lines 45-59].

The term “electrodeposited” is method recitation in a device claimed. Note that only the final product is relevant, not the method of making. A product by process claim is directed to the product per se, no matter how actually made. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claimed in “product by process” claims or not.

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With regard to claim 37, Lopatin et al. discloses the structure further comprising a metal cap layer (320) on the CoWP film.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 4, 25 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lopatin et al. (PN 6,528,409).

Lopatin et al. discloses x is about 84 (100 – 12 at % of W – 4 at % of P) and y between about 2-4 atoms percent. Lopatin et al. does not disclose the at % of tungsten is  $0.03 < y < 0.07$ . Although Lopatin et al. does not teach the at % of the tungsten, as that claimed by Applicants, however, it would have been obvious to one having ordinary skill in the art at the time the invention was made to form the tungsten having a desired at %, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

***Allowable Subject Matter***

5. Claims 7, 26, 27 and 36 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

6. The following is an examiner's statement of reasons for allowance:

Applicant's claims 7, 26, 27 and 36 are allowable over the references of record because none of these references disclose or can be combined to yield the claimed interconnect structure or composite material further comprising a metal cap layer on the CoWP film wherein the CoWP film and the metal cap layer are disposed within the trench or the via of the dielectric material, as recited in claim 7, and the interconnect structure further comprising a capping material on the copper conducting layer wherein the capping material consist essentially of  $\text{Co}_x\text{W}_y\text{P}_z$ , wherein  $0.68 < x < 0.88$ ;  $0.01 < y < 0.10$ ; and  $z = (1 - (x + y))$  as recited in claim 26, and the interconnect structure further comprising a CoWP barrier layer disposed between the copper layer and the metal layer, wherein the capping material consist essentially of  $\text{Co}_x\text{W}_y\text{P}_z$ , wherein  $0.68 < x < 0.88$ ;  $0.01 < y < 0.10$ ; and  $z = (1 - (x + y))$  as recited in claim 36.

### ***Conclusion***

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung K. Vu whose telephone number is (571) 272-1666. The examiner can normally be reached on Mon-Thurs 6:00-3:30, alternate Friday 7:00-3:30, Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on (571) 272-1732. The Central Fax Number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

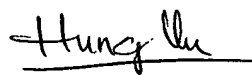


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Vu

October 28, 2004

A handwritten signature in cursive script, appearing to read "Hung Vu", is written over a horizontal line.

Hung Vu

Patent Examiner